II. BACKGROUND — OVERVIEW OF GLOVEBOX AND FILTER FIRE, AND EXPLOSION

A. Overview

The Original Rocky Flats Fire Report prepared October 7, 1957,[15] and Supplementary Report on the Fire dated December 10, 1957[17] adequately describes the origin of the fire in the glovebox and subsequent fire spread within Building 71's Room 180 which occurred September 11, 1957, at Rocky Flats, Colorado. However, issues addressed in this Report will be taken with the Original Rocky Flats Report's: (1) Time Line presented on pages 15-17 as it relates to the building's Main Exhaust System fan shutdown; and (2) the proposed theories offered as to the reason for the explosion which resulted in gross plutonium contamination throughout Building 71 and release of plutonium to the atmosphere via the stack.

The fire within Building 71, which "handled the highest level of radioactive particulate matter" at the plant,[15] started in a conveyor glovebox within Room 180. This room was used for Research & Development (R&D) and began operation in April/May 1957. The fire spread unchecked both outside the glovebox and into the glovebox's prefilter, the Booster Exhaust System's ductwork and this system's filters and ultimately into the building's Main Exhaust System Plenum filters. Several other gloveboxes also utilizing Plexiglas in their construction were also burned and were in flames when the fire was discovered by security personnel.

During the course of this fire, Rocky Flats fire fighting and lab supervisory personnel fought the fire using portable and then a wheeled 100 lb. carbon dioxide extinguisher. These proved ineffective in extinguishing the glovebox fire which then spread to other combustible material within Room 180. Because of the presence of plutonium (Pu) within Room 180, there was reluctance to use water on the fire. However, permission was finally granted by lab supervisory personnel to use water spray (i.e., fog nozzle) from a fire hose. The water was directed to the ceiling and allowed to cascade down onto the fire similar to the operation of automatic sprinklers. The fire in Room 180 was quickly extinguished in this manner.

It was, however, unknown to the personnel fighting this fire that this fire had spread into the building's Main Exhaust System Plenum filters. While assessing the fire damage within Room 180, personnel were reported to have heard a "whoosh" or "puff" sound followed by a pressure front that knocked down those in Room 180 and in the adjacent corridor. No one was injured. At this time, the fire within Room 180 rekindled and was quickly extinguished using portable CO_2 extinguishers. When the fire within the plenum area was discovered through the observance of smoke coming out of the building's Main Exhaust System stack by the Boiler Operator (approximately 18 minutes after the fire was discovered) and by Rocky Flats fire fighting personnel located outside Building 71, personnel responded to the access doors to the plenum area with fire hose and began fighting this fire. The plenum filter fire was "knocked down" at 2:00 a.m.

However, overall firefighting efforts extended over a 13-hour period, from the time of the discovery until this fire was completely extinguished. During the after-fire damage assessment, it was determined that gross plutonium contamination occurred throughout Building 71. Monitoring that took place during and after the fire both on and off site also indicated some off-site contamination. Several theories of how the explosion, resulting in the disbursement of plutonium dust, occurred were offered in the original Rocky Flats Fire Reports.

B. Time Line as Stated in the Original Rocky Flats Fire Report (pages 15-17)[15]

Fire occurred — September 11, 1957

10:10 PM	Fire discovered in Room 180
10:12 PM	First fire truck arrived at Building 71
10:14-10:24 PM	Portable CO_2 fire extinguishers collected for use in fire fighting while personnel were suited up with protective equipment
10:23 PM	Calls made to additional building supervisor personnel
10:24 PM	Personnel entered Room 180 with CO_2 extinguishers which proved ineffective on fire
10:25 PM	Building's main exhaust system fans ordered to be placed on high speed
10:27 PM	Wheeled (100 lb.) CO_2 extinguisher discharged without effect
10:28 PM	Smoke noticed coming from the building's Main Exhaust System stack by the boiler operator
10:37 PM	Water spray nozzle on fire hose discharged at ceiling of Room 180 to combat room fire
10:38 PM	Fire extinguished in Room 180 and water shut off
10:39 PM	Explosion in exhaust system. “Personnel ordered out of Room 180.” (This occurred when people in Room 180 and those in the adjacent corridor were knocked down by the explosion.) Building evacuation ordered due to contamination. Several personnel resuited with protective clothing/equipment and re-entered Room 180 to extinguish rekindled fires using CO_2 extinguishers
10:40 PM	Fans went off
10:47 PM	Second fire truck requested by Rocky Flats Fire Lieutenant fighting fire. Personnel proceeded to check the plenum area filter bank and discovered it on fire
10:58 PM	Second Rocky Flats fire truck actually called
11:02 PM	Second Rocky Flats fire truck left station
11:05 PM	Second Rocky Flats fire truck arrives at Bldg. 71
11:10 PM	Fire fighting personnel take fire hose into plenum area. Electrical power failed in entire building
11:15 PM	Fire service water is discharged from fire hose onto filter bank

Fire controlled/extinguished — September 12, 1957

2:00 AM	Filter fire knocked down
11:28 AM	Fire completely extinguished

C. Factors Contributing to the Fire's Severity

The original Rocky Flats fire report stated nine factors that contributed to the fire:

1. Chemical reactivity of alpha-plutonium (was probably significant in providing a source of ignition)
2. Use of Plexiglas (in glovebox construction without metal separators between the adjacent Plexiglas gloveboxes contributed to the fire spread)
3. Delay in use of CO_2 extinguishers (while personnel were being suited up)
4. Delay in use of water (because of health and criticality concerns)
5. Heat detection equipment in plenum filter area — clean air side (inoperative)
6. Flammability of Cambridge CWS-6 filters (known for some time)
7. Access to plenum area (to combat the filter fire)
8. Loss of power (due to burned-through conduit in the plenum and subsequent loss of light hampered fire fighting)
9. Radioactivity requiring protective clothing for fire fighters - initial delay (and perhaps delay in fighting the plenum area fire), gross plutonium contamination and associated clean-up problems.

*** END OF SECTION II ***